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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,912	11/21/2003	Tzong Da Ho	55855-DIV (71987)	4010
21874	7590	10/30/2006	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			DUONG, KHANH B	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/719,912

Applicant(s)

HO ET AL.

Examiner

Khanh B. Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 August 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-4 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

This office action is in response to the amendment filed August 24, 2006.

Accordingly, claim 1 was amended. Claims 5-8 were previously canceled.

Currently, claims 1-4 remain pending.

### ***Response to Arguments***

Applicant's arguments with respect to the amended claim have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem et al. (U.S. Patent No. 6,392,290).**

Kasem et al. ("Kasem") discloses in FIGs. 47A-58C [see col. 9, line 24 to col. 10, line 55] a method for fabricating a thermally-enhanced wafer-level chip scale package, comprising the steps:

(1) preparing a semiconductor wafer 227 having a front side and a back side, and which is predefined into a plurality of integrated circuit chips 220 [see FIG. 47A-47C];

(2) performing a bumping process to bond a plurality of solder bumps 248 on the front side of the semiconductor wafer 227 [see FIG. 56A-56C];

(3) performing a back-side lapping process to grind away a back-side portion of the semiconductor wafer 227 [see FIG. 54A-54C];

(4) attaching a thermally-conductive stiffener (Cu heat sink) 245 to the back side of the semiconductor wafer 227 by means of a thermally-conductive adhesive layer 246, wherein the thermally-conductive stiffener 245 is free of electrical connection with the semiconductor wafer 227 [see FIG. 55A-55C];

(5) performing a singulation process to cut the thermally-conductive stiffener 245 and cut apart each chip 220 from the semiconductor wafer 227 [see FIG. 58A-58C]; and

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(6) performing a flip-chip die bonding process to mount each singulated chip 220 by means of the solder bumps 248 onto a circuited substrate [see FIG. 58A-58C].

Re claim 1, Kasem discloses performing the bumping process after, instead of prior to, the back-side lapping process.

However, the selection of any order/sequence of performing process steps is prima facie obvious in the absence of new or unexpected results. See *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959); *In re Burhans*, 154 F. 2d 690, 69 USPQ 330 (CCPA 1946); and *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

Re claim 3, Kasem discloses the thermally-conductive stiffener (heat sink) 245 is made of copper [see col. 10, lines 22-26].

**Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem in view of Chen et al. (U.S. Patent No. 6,403,882).**

Re claim 2, Kasem discloses the thermally-conductive adhesive 246 comprises solder or epoxy. However, Kasem fails to disclose the epoxy comprising silver epoxy.

Chen et al. ("Chen") suggests attaching a thermally-conductive stiffener 50 comprising of copper to the back side of a semiconductor wafer 20 by a conductive adhesive 45 comprising silver epoxy [see col. 2, lines 45-48; and col. 3, lines 15-25].

Since Kasem and Chen are from the same field of endeavor, the purpose disclosed by Chen would have been recognized in the pertinent prior art of Kasem.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kasem as suggested by Chen since Chen states that the conductive adhesive 45 is selected so that it remains stable during

subsequent processing of the chip package at elevated temperatures [see col. 3, lines 6-14, and lines 45-52].

Furthermore, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

**Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem in view of Searls et al. (U.S. Patent No. 6,550,531).**

Re claim 4, Kasem fails to disclose the thermally-conductive stiffener 245 being made of copper alloy.

Searls et al. ("Searls") teaches in FIG. 5 a thermally-conductive stiffener 208 comprising copper alloy [see col. 1, lines 31-35].

Since Kasem and Searls are from the same field of endeavor, the purpose disclosed by Searls would have been recognized in the pertinent prior art of Kasem.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kasem as suggested by Searls because such conductive material is selected so that it acts as a heat sink which increases the thermal performance of the chip package.

Furthermore, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Noquil et al. (U.S. Patent No. 6,645,791) teaches in FIG. 3 performing the bumping process prior to the back-side lapping process [see col. 5, line 55 to col. 6, line 2].

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

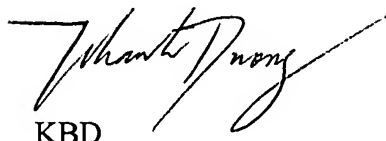
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on 10:00-6:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith, can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD



Zandra V. Smith  
Supervisory Patent Examiner  
27 Oct. 2006